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L'ENFANT TERRIBLE MEETS THE EDUCATIONAL CRISIS

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> The results [of applications of behavior analysis to education] are interesting but are akin to those produced by an infant who acquires a hammer and then discovers that everything in the environment needs hammering. (Brophy, 1983, p. 11)

Brophy's statement was part of a rebuttal to a paper published in the *Educational Researcher* over 8 years ago (Greer, 1983). In that paper, I made four claims: (a) There was a science of pedagogy based on a science of behavior, (b) the results of behavior analysis had been more fruitful in producing a science of pedagogy than had educational research, (c) this difference in results was due to the characteristic scientific practices used by each group, and (d) educational researchers had been remiss in ignoring the findings and epistemology of the science of behavior. I stated that there was a science and technology of pedagogy awaiting dissemination.

In his rebuttal, Brophy suggested I was naive, and that although he could agree that there were some useful findings from behavior analysis for classroom management, they were simply piecemeal approaches. He suggested that behavior analysis would never be used on a total school-wide basis because it required too much control, rigor, and precision. The American public just would not stand for it! Moreover, he stated that the reputable behavior analysts that he knew would agree with him that my conclusions were too grandiose for the data base. Actually, the 60 some letters I received from readers of that journal agreed in whole, or in part, with my position. Many of those who wrote were prominent in the field. They shared findings from their work that they believed to be consistent with my conclusions.

Alas, not only do I continue to maintain that there is a technology and science of pedagogy, I now suggest that its widespread application is necessary to save America's schools and children! Does this make me a disreputable scientist (i.e., *l'enfant terrible*)? Allow me to hammer.

The national concern about the plight of America's schools has grown to the point that President George Bush seeks to be remembered as the education president. Our economic, cultural, and physical environment is dependent on what and how effectively our schools teach. Ironically, as the problem has grown, so has the data base for a science of pedagogy and schooling.

A necessary component of the solution is the consistent and persuasive application of behavior analysis to pedagogy. The basic problem is one of inadequate pedagogy (Greer, 1983, 1989, 1991b; Keller, 1978; Skinner, 1984). There are several educational models derived from our science that show the way to more effective schooling practices, including programmed instruction (Vargas & Vargas, 1991), direct instruction (Kinder & Carnine, 1991), the personalized system of instruction (PSI) (Buskist, Cush, & De Grandpre, 1991; Keller, 1968), precision teaching (Lindsley, 1990, 1991), and ecobehavioral analysis (Greenwood, Carta, Arreaga-Mayer, & Rager, 1991). None of these approaches are piecemeal. They deal with diverse curricula (Kinder & Carnine, 1991) and improved curriculum-based assessment (Lindsley, 1991). They promise pedagogy-driven applications for the computer (Vargas & Vargas, 1991), and they show the way to individualization with large classes (Buskist et al., 1991). They show that in those cases in which effective teaching practices are found in the existing system, those practices are closely aligned

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with the basic strategies and tactics from the science of behavior (Greenwood et al., 1991).

Brophy (1983) suggested, however, that behavior analysis could never be applied on a schoolwide basis. Over the last decade, my students, colleagues, and I have been redesigning individual schools around the tenets that (a) the students and parents are the customers, (b) the school should be designed around what we know rather than applying behavior analysis to a faulty model, and (c) all responses of schooling should be directly and continuously measured (Barrett et al., 1991; Greer, 1991b). The results of that research and those applications have been published recently (Albers & Greer, 1991; Greer, 1991a; Greer, McCorkle, & Williams, 1989; Ingham & Greer, 1992; Lamm & Greer, 1991; Selinske, Greer, & Lodhi, 1991). Our comprehensive application of behavior analysis to schooling (CABAS) has now been implemented in six schools in the United States and one in Italy. Students in the schools learned from four to seven times more after CABAS was implemented than before its implementation.

Two of the schools, the Margaret Chapman School and the Fred S. Keller School, have been CABAS schools for 10 and 5 years, respectively. They are fully realized models and exemplify the characteristics depicted in Figure 1. The use of behavior analysis is systemic, with the applications of behavior analysis continuously evolving based on the cybernetic relationship between the parts of the system. As to the question of control raised by Brophy, the control is strongly in the hands of students' parents. Teachers, supervisors, and parent trainers are accountable to the students and their parents, perhaps more so than has ever been possible with the extensive use of measurement and the technology of behavior analysis. When students encounter difficulties, the locus of blame is placed on current instructional procedures or histories of instruction, not on the students or parents. Supervisors and teachers use behavior analysis to fix the problem. Inadequate student responding is traced to deficits in our instruction, and efforts are made to plug the deficits with more and better analyses of the contingencies and instructional histories.

Typically, inadequate procedures are traceable to three sources: (a) the teacher's presentation of the three-term contingency (Ingham & Greer, 1992), (b) deficits in the instructional history needed by the student to perform adequately at the current task, or (c) setting events and stimuli that affect the reinforcing operations used by the teacher. Variables associated with difficulties in any of these three areas are applied to the problem, much as one does in any inductive scientific approach. If the teacher's presentation is accurate (e.g., an unambiguous antecedent, followed by an appropriate intraresponse period, followed in turn by the delivery of an appropriate consequence) and the student still has difficulty, it is probable that the difficulty is traceable to one or more components of the remaining sources (e.g., instructional history or setting events). In the latter cases, either prerequisites are taught (e.g., instructional history deficits) or the effects of setting events are ameliorated (e.g., the child who is sleepy takes a nap).

The implementation of CABAS requires sophisticated practitioners. Bailey (1991) has pointed out that the use of jargon and obtuse descriptions of behavior analysis can scare the customer away. He is correct, of course, if the application is a simple one. Schools and the problem of education are complex, however, and call for sophisticated practitioners. One of the strongest tenets of applied behavior analysis has been the necessity of conducting the analysis in the setting for its intended use. Behavior analysts triumphed in educational research, in part, because they stayed longer in the classroom than did our hypothetical deductive colleagues. However, if we are to meet the crisis, we can no longer simply visit, we must live there. In the CABAS approach, the educators (teachers, supervisors, school psychologists, and parents) are involved continuously in the enterprise of behavior analysis not as an adjunct to schooling but as the thread that ties together all of the roles. Even the parents engage in fairly sophisticated forms of behavior analysis. In July 1991, the parents of the students at the Fred S. Keller School presented a research poster session with 11 research posters done

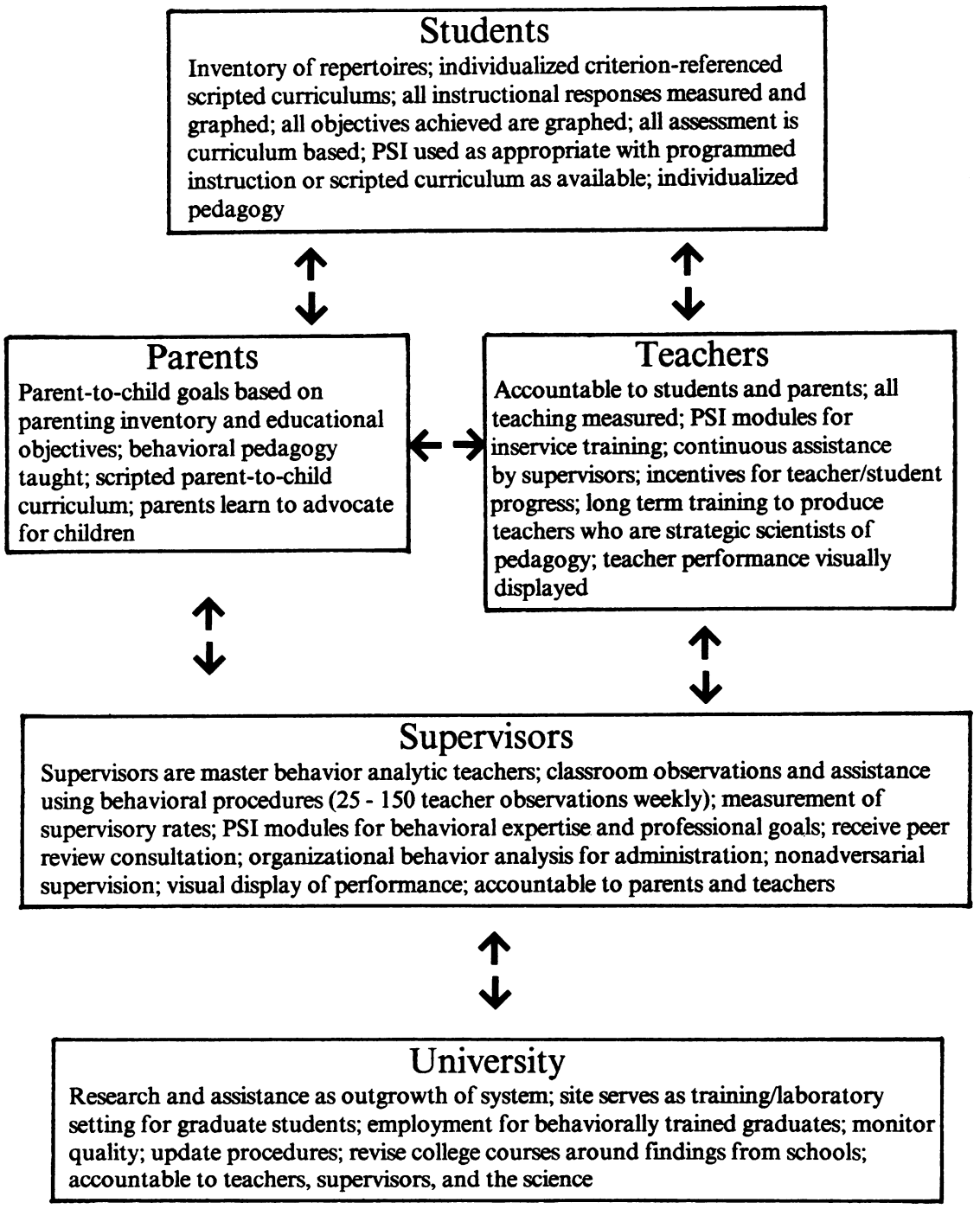

Figure 1. The components of the comprehensive application of behavior analysis to schooling (CABAS) showing the reciprocal relationships between students, teachers, parents, supervisors, and universities.

by the parents. Over 30% of the parents were involved in parent training during 1990.

We should not be surprised that behavior analysis is not applied generally by teachers as a result of our data base or a few workshops or courses. The school environment must be designed to maintain and improve the pervasive applications of the science of behavior. The pervasive application of behavior analysis is neither simple nor necessarily natural, but applications by teachers and supervisors can become second nature, provided the environment is appropriately designed and maintained (Greer, 1991b; Greer et al., 1989; Lamm & Greer, 1991). The environment can be changed piecemeal (Greenwood et al., 1991; Ingham & Greer, 1992) or all at once (Selinske et al., 1991), but it must be continuously maintained, monitored, and refined.

Critics will still have legitimate objections. Precision teaching has to date been used by only a few thousand teachers in only a few hundred schools (Lindsley, 1991). Direct instruction is used in only a few thousand schools (Kinder & Carnine, 1991). Only special education is mandated to produce individualized education programs that incorporate parent input for establishing educational objectives. Programmed instruction has yet to be used adequately (Vargas & Vargas, 1991). A PSI approach still needs to be applied broadly and consistently. Moreover, CABAS remains to be tested in large schools that integrate children of all ability levels.

Although the data are not all in (and never will be), I suggest that the science and technology are available for generating the innovative and effective schools of 2000 A.D. that Bush calls for (NASDC Request for Comment on RFP, 1991). In fact, we can produce schools that will exceed the mandates called for in Bush's program. We can measure costs in terms of learning and assess learning in terms of effects on the cultural and economic fabric of our society. It will not be a short-term task; it will not be simple, nor will it be easy. But, we have already accomplished significant pieces of the task, and we have actually achieved the total task in small schools.

Do my claims make me a disreputable scientist? If so, I have good company (Keller, 1978; Skinner, 1984). Do my claims make me *l'enfant terrible* with an indiscriminate hammer? If so, I am easily now a toddler; I now have a sledgehammer, and the targets are clear. Sometimes one has to tear down a nonfunctional structure in order to rebuild a useful one. We shall see.

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